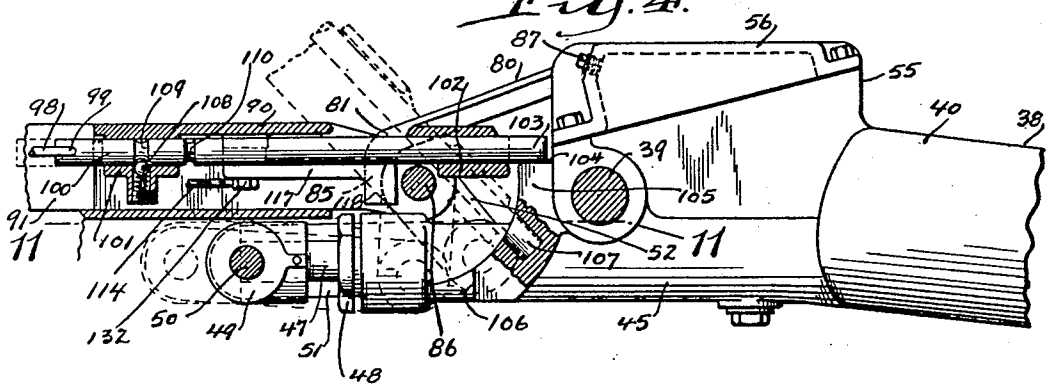
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HYDRAULIC JACK

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Fig. 4.



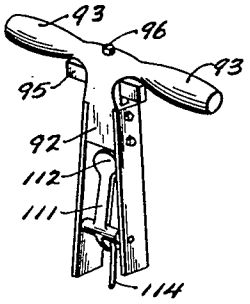
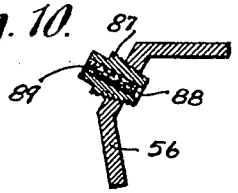


Fig. 1.

Fig. 10.



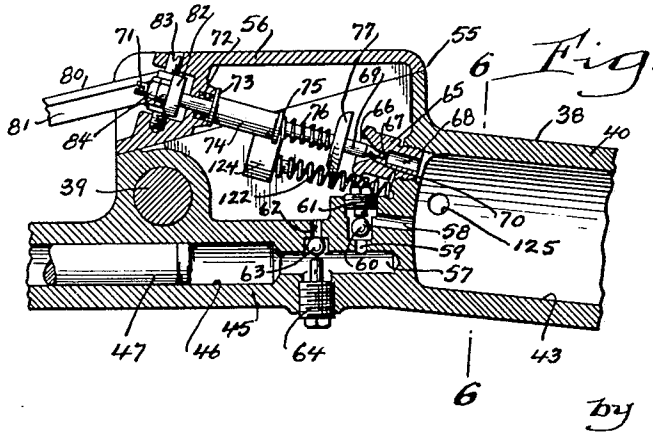


Fig. 3.

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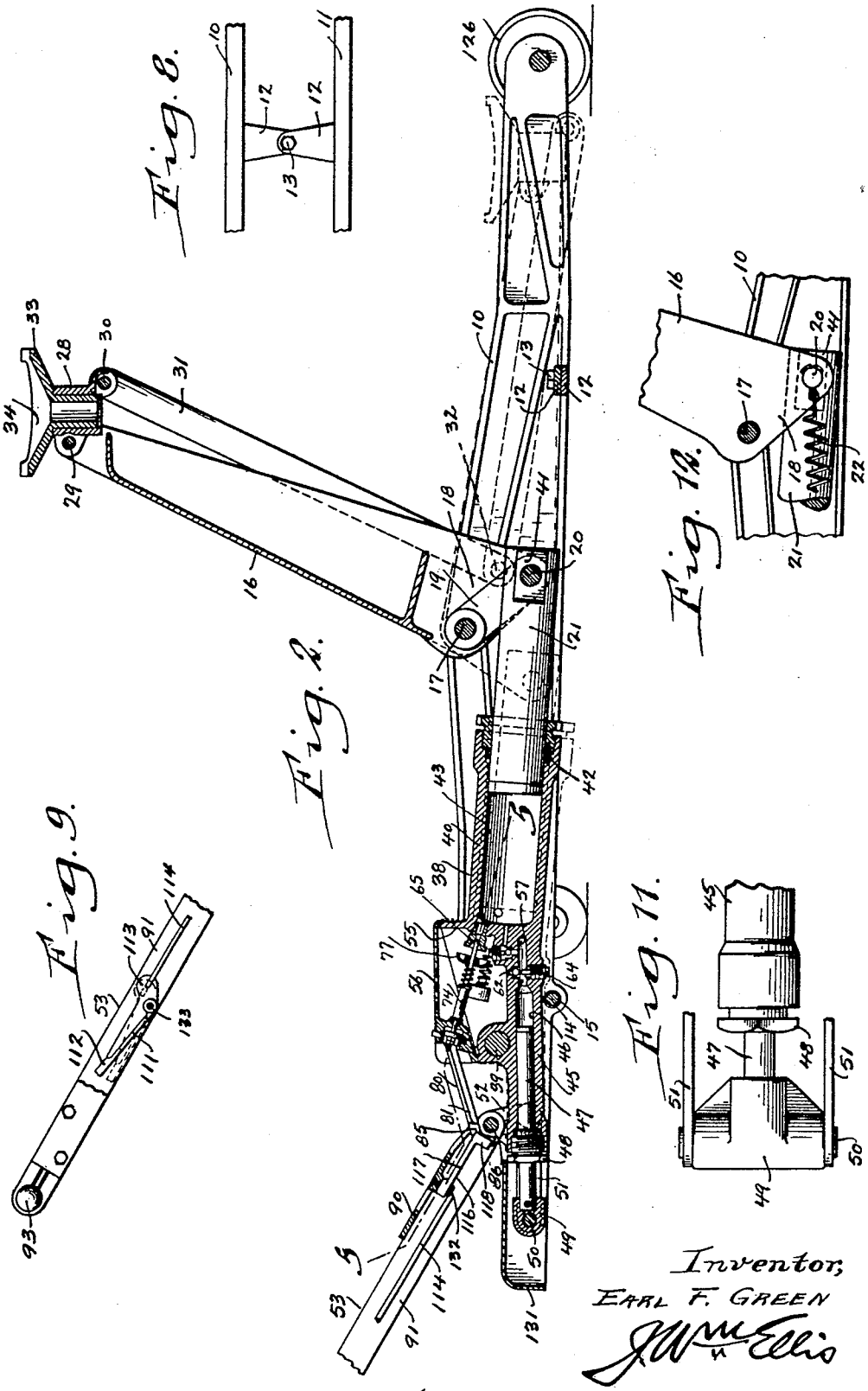


Fig. 8.

Fig. 2.

Fig. 12.

Fig. 9.

Fig. 11.

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HYDRAULIC JACK

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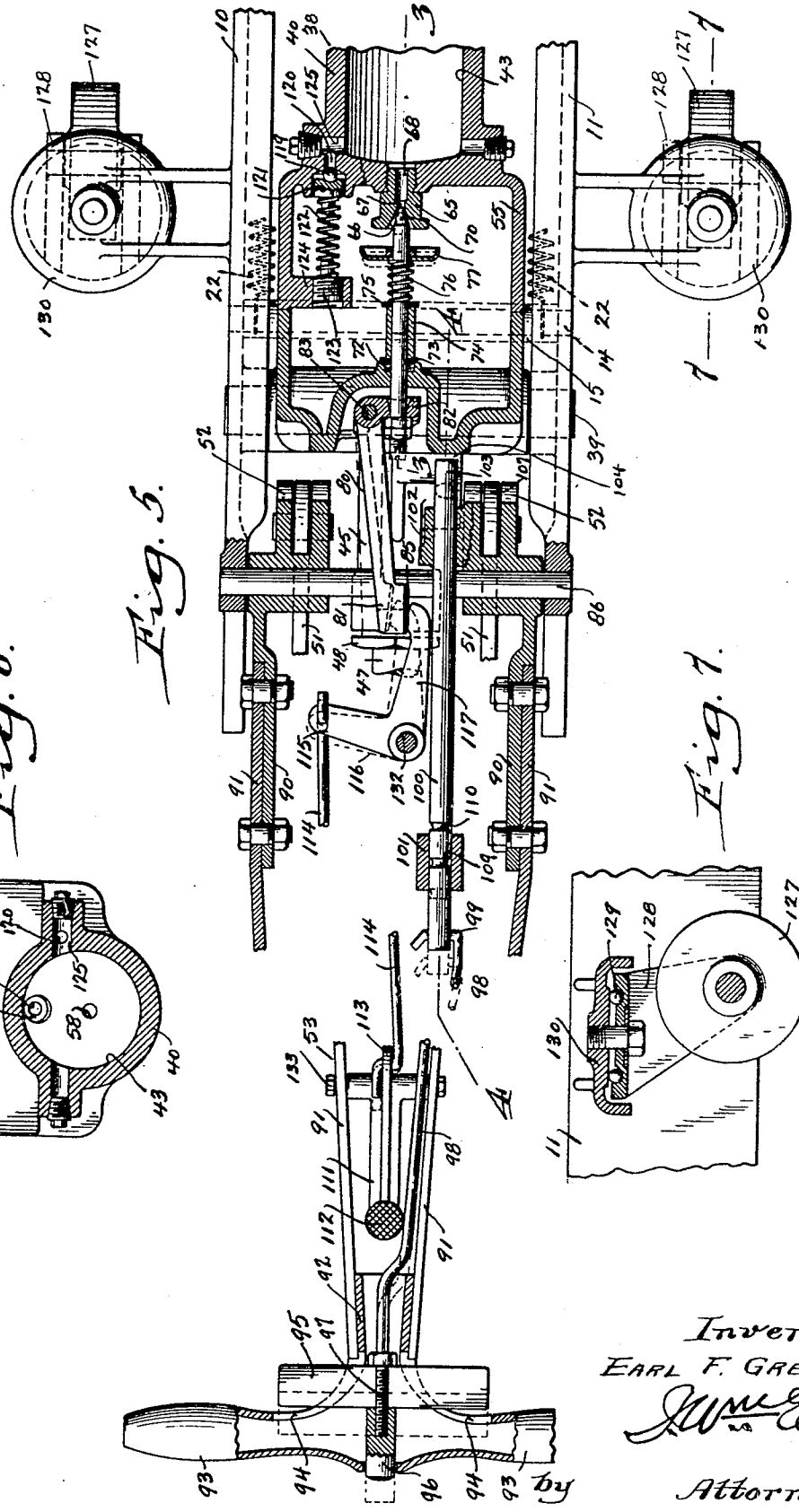


Fig. 5.

Fig. 6.

Fig. 7.

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UNITED STATES PATENT OFFICE

2,039,895

HYDRAULIC JACK

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Application May 7, 1935, Serial No. 20,186

6 Claims. (Cl. 254—2)

My invention relates in general to hydraulic jacks and in particular to that type of jack having a pivoted power arm for raising automobiles, and known as garage or floor jacks.

One of the objects of my invention has been to provide a jack having a release valve which is so designed that the oil passing by the same shall keep the valve and its seat clean.

Another object has been to provide a jack having a release or lowering lever so located as to be within convenient reach of the operator but being so positioned that it will not be accidentally operated.

Another object has been to provide a release control which shall be protected against accidental operation, said control being operable from the handle at any position of the handle.

Another object has been to provide a jack having means for locking the operating handle in various positions.

Moreover, it has been an object to provide locking means which shall be retained in both their unlocked and locked positions.

Another object has been to provide a jack having a release valve which shall be carried by the cover of the reservoir, whereby release mechanism is easily accessible.

Another object has been to provide a power unit for a jack of this type having the release valve arranged near the top of the cylinder, whereby any entrained air will be readily discharged.

Moreover, my invention is of such nature that the power arm is directly connected to the power piston.

Furthermore, my device is provided with a baffle plate mounted on the release valve which prevents oil returning from the lifting cylinder from impinging upon the valve stem packing or the breather opening of the reservoir.

The above objects and advantages have been accomplished by the device shown in the accompanying drawings, of which:

Fig. 1 shows a perspective view of my complete device.

Fig. 2 is a longitudinal, sectional elevation thereof.

Fig. 3 is an enlarged, fragmentary, longitudinal, sectional view of the oil valve control mechnism, taken on line 3—3 of Fig. 5.

Fig. 4 is an enlarged, fragmentary view partly in section, showing the handle locking mechanism and is taken on line 4—4 of Fig. 5.

Fig. 5 is a fragmentary, sectional, plan view taken on line 5—5 of Fig. 2, and also showing the operating handle with portions thereon broken away.

Fig. 6 is a sectional view taken on line 6—6 of Fig. 3.

Fig. 7 is a sectional view through one of the swivel wheels and is taken on line 7—7 of Fig. 5.

Fig. 8 is a detailed plan view of a portion of the side frame members.

Fig. 9 is a fragmentary view of the upper section of the operating handle.

Fig. 10 is a fragmentary, sectional view of the oil reservoir filler plug.

Fig. 11 is an enlarged, fragmentary, plan view of the oil pump and connecting links.

Fig. 12 is a fragmentary, side view showing the connections of the pull-back springs with the power arm.

My device comprises two side frame members 10 and 11 which are held together preferably by a spacing arm 12 carried by each member and secured together by means of a bolt 13. These spacing arms are arranged near the forward end of the frame, and a spacing stud 14 is passed through suitable apertures in the frame members near the rear end thereof and this stud carries a spacing sleeve 15.

The power arm 16 of my device is pivotally secured between the side members 10 and 11 of the frame at a point substantially midway their length and is designed to have its outer end movable toward the forward end of the jack, as shown in dotted lines in Fig. 2. This power arm is mounted upon a pivot pin 17 which has its ends supported by the side members. This arm is of U-shape cross section and the lower end thereof is provided with a propelling lever 18 which is reinforced by pads 19 extending from the pivot pin 17 of the arm to the pivot pin 20 carried by the propelling lever. The pivot pin 20, as shown in Fig. 2, is connected directly to the power piston 21, to be hereinafter described. Pull-back springs 22 are provided for the power arm. These springs have their forward ends preferably attached to the outer ends of the pivot pin 20 or to the cotter pins carried thereby, as clearly shown in Fig. 12. The other ends of the springs extend rearwardly and are preferably attached to the spacing stud 14 and sleeve 15.

At the upper end of the power arm is arranged a rest plate bearing 28 which is pivotally connected at one side to the upper end of the power arm by means of the pivot pin 29. At a point on the opposite side of the bearing is provided a pivot pin 30 to which the upper ends of two drag links 31 are connected. The lower ends of these

drag links extend downwardly in substantial parallel relationship to the power arm and have their lower ends connected to the frame members by means of pivot pins or bolts 32. Pivotally carried by the rest plate bearing is a rest plate 33. This rest plate, as is customary, is preferably pivotally carried by the bearing and has its upper face formed with a suitable depression 34 for non-slipping engagement with various parts of the chassis of an automobile.

The power unit 38 of my device is located preferably at the rear of the frame members and disposed therebetween. It comprises preferably a unitary casting which is pivotally suspended between the frame members upon a pivot pin 39. This unit is formed in its forward end with a power cylinder 40 having a bore 43 within which is slidably mounted the power piston 21. The piston is provided on opposite sides with flattened surfaces 41 which are arranged between and engaged with the propelling levers 18 through the pin 20, as hereinbefore pointed out. The outer end of the cylinder is sealed by means of a packing gland 42.

Formed in the power unit at the rear of the cylinder 40 is a pump cylinder 45 having a bore 46 within which is slidably mounted a pump plunger 47. A packing gland 48 is arranged at the outside of the cylinder 45 for sealing the piston. The plunger 47 extends rearwardly toward the rear end of the device where it is provided with a plunger head 49. Passing transversely through the plunger head is a pivot pin 50. Attached at their outer ends to the ends of the pins 50 are two plunger links 51. These links extend forwardly and are connected at their forward ends to downwardly extending operating arms 52 of the operating handle 53, to be hereinafter described.

Mounted above the cylinder 45 and at the rear of the power cylinder 40 is an oil reservoir 55 having a cover 56. Connecting the bore 46 of the pump cylinder 45 with the bore 43 of the power cylinder 40 are two passageways 57 and 58. These passageways are brought into communication by means of a vertical passageway 59 arranged above which is a ball check valve 60, held in place by a retaining plug 61. Oil being forced from the pump cylinder 45 through the passageway 57 will raise the check ball 60 and allow oil to be forced through passageway 58 into the power cylinder 40. Extending upwardly from the passageway 57 and into the oil reservoir is a passageway 62 which has a ball check valve 63 arranged at its lower end and held in spaced relation therewith by means of a retaining plug 64. Oil for the pump cylinder 45 is drawn through passageway 62 into the cylinder 45 through the passageway 57. Upon the return stroke of the plunger, the ball valve 63 is closed, thus forcing the oil, as just above described, into the power cylinder. Near the top of the bore 43 of the power cylinder 40 is arranged a valve plug 65 having a V-shaped seat 66 formed therein which is in communication with the cylinder through ports 67 and 68. A release valve stem 69 is mounted in the oil reservoir and has its forward end 70 pointed for engagement with the seat 66. The rear end 71 of the valve stem is passed through a suitable aperture formed in the cover 56 of the reservoir where it is provided with suitable packing 72 of material such as felt. A washer 73 is arranged about the stem and disposed immediately in front of the packing, and a spacing sleeve 74 is also preferably mounted upon the stem and in engagement with the washer. A washer 75 is disposed at the outside end of the sleeve and serves as an abutment for a helical spring 76, mounted on the stem and serving to force the pointed end thereof upon its seat. A baffle plate 77 is rigidly carried by the stem and disposed in front of the spring so as to act as an abutment therefor. This baffle plate is located near the valve plug 65 and is concave or dished on the surface which faces this plug, so that the oil coming through the ports 68 and 67 and passing by the pointed end 70 of the stem, will strike the baffle plate and be deflected laterally from the stem, thus preventing the oil under pressure from striking the packing 73 or the opening 88 of the breather plug, to be hereinafter described, and possibly forcing its way therethrough. Carried by the cover 56 of the oil reservoir is a breather plug 87 which is provided with the central aperture 88 in which is mounted a plug of felt 89. When oil is being drawn from the reservoir or being discharged therein, air can pass into and out of the reservoir through this plug.

Carried by the cover 56 of the oil reservoir is a release lever 80 having an outwardly extending arm 81 and a laterally extending arm 82. This lever is carried by a pin 83 attached to the reservoir cover. The arm 82 of the lever is provided with a tapered opening through which the outer end 71 of the valve stem passes, suitable nuts 84 being carried by this end of the stem for engagement with the outer face of the arm 82 of the lever. The arm 81 of this lever extends rearwardly and downwardly and is provided at its extreme outer end with a curved portion 85. This curved portion has its face lying in a vertical plane and it is preferably disposed about the pivot pin 86 of the operating handle 53, for reasons to be hereinafter described.

The operating handle 53 of my device has a yoke 90 at its lower end which is pivotally carried by the pivot pin 86. The arms 52, hereinbefore described, are made a part of this yoke. The operating handle is preferably made of two flat interspaced bars 91 which are secured by suitable bolts to the side of the yoke 90. These bars are attached at their upper ends to a handle member 92. This handle member is provided with suitable handle grips 93 by which the handle may be conveniently manipulated, as well as providing means for elevating the forward end of the jack and moving it to the desired position. The handle member is provided at its under side with slots 94 in which is movable a finger grip 95. Extending outwardly through the center of the handle member and attached to the finger grip is a button 96. The button and finger grip are preferably held together by means of the screw-threaded upper end 97 of a control rod 98. This rod is preferably offset, as shown in Fig. 5, and it extends downwardly along the inside of one of the bars 91. The lower end of the contact rod 98 is provided with a right-angled bent portion 99 which is engaged with a locking plunger 100. This locking plunger is slidably mounted in suitable bearings 101 and 102 carried by the operating handle yoke 90. This locking plunger together with its associated parts forms the handle locking mechanism of my device. The forward end 103 of the locking plunger, when the operating arm 53 is in the horizontal position, is engageable with a ledge 104 formed by a lug 105 carried by the power unit immediately in the rear of the reservoir. When the operating handle is in its vertical position the end 103 of the

locking plunger will engage with a vertical surface 106 at the lower end of the lug 105. A number of holes 107 may also be provided in the arcuate face of the lug 105 for the engagement of the end 103 of the plunger when in any number of desired positions. The bearing 101 for the locking plunger is preferably provided with a spring-pressed detent ball 108 which engages with either of two annular grooves 109 or 110 formed in the locking plunger. As shown in Fig. 4, when the groove 109 is engaged by the ball detent, the plunger is retained in its engaging position, whereas when the plunger is drawn backwardly by the finger grip 95 through the medium of the contact rod 98, the plunger will be held in its inoperable position. The finger grip 95 serves to draw the end 103 of the locking plunger out of engagement with the coacting surfaces 104 and 106 and hole 107, and the button 96 serves to force the same into engagement therewith.

Pivotally mounted between the bars 91 of the operating handle and upon a bolt 133 is a lowering lever 111 which is within convenient reach of the operator. This lever is provided with a serrated operating end 112 which, as shown in Fig. 9, can only be reached by passing the finger in between the side bars 91 of the handle. This lever is provided with an upwardly extending arm 113 to which is pivotally attached a lowering rod 114. The lower end of the lowering rod is pivotally attached to the arm 115 of a release valve segment 116. This segment is pivotally attached to the yoke by means of a pivot pin or bolt 132, and is provided with a forwardly extending arm 117 which is formed on its extreme outer end with a pad 118. As hereinbefore pointed out, the surface of the curved portion 85 lies in a vertical plane and the pad 118 is, therefore, engageable with such curved portion 85 at any point in the operation of the operating handle 53. The release lever 80 is thereby operated by pressure upon the button 112 of the lowering lever 111, through the medium of the lowering rod 118 and the release valve segment 115.

The power cylinder 40 is preferably provided with safety means which prevent the jack from being operated to lift a load beyond the designed capacity thereof. These means preferably comprise a ball check valve 119 (see Fig. 5) which is pressed against a port 120 by means of a stud 121 and a spring 122. A screw 123, carried by a lug 124, formed on the inside of the reservoir 55, bears against the opposite end of the spring. The port 120 is brought into communication with the bore 43 of the cylinder by means of a port 125.

The frame of my device is preferably provided with wheels 126 at the forward end and with caster wheels 127 at a point near the rear end thereof. Each of the caster wheels is carried by a caster yoke 128 which is supported upon ball bearings 129 carried by the yoke and engageable with caster arm 130 carried at each side of the device.

A pump plunger guard 131 is preferably carried at the rear end of the device and mounted between the rear ends of the frame members 10 and 11. This guard covers the outer end of the pump plunger 47 together with the plunger head 49 and rear ends of the plunger links 51.

From the foregoing, it will be clear that by pumping the operating handle up and down in any desired position and through any desired or necessary range, oil will be conducted from the reservoir and forced into the power cylinder 40 past the ball valves 63 and 69, as hereinbefore described. The power piston 25 will be moved forwardly in the cylinder 40 as oil is fed therein, and as it moves forwardly, it will cause the power arm and the vehicle carried thereby to be elevated the desired amount. When it is desired to lower the vehicle, the release valve stem 69 is moved axially through the release mechanism hereinbefore described and the oil is permitted to pass through ports 68 and 67 of the valve plug 65 and past the end 70 of the valve stem, whereby the oil will be conducted back to the reservoir. Since the angle formed by the V-shaped seat 66 of the plug 65 is preferably greater than the angle of the pointed end 70 of the release valve stem 69, the oil returning from the power cylinder to the reservoir, as just above described, will be forced under considerable pressure past the pointed end 70 of the valve and over the surface 68 of its seat and thus serve to keep this valve clean and in normal working condition. As hereinbefore pointed out, the oil entering the reservoir will be deflected by the baffle plate 77 and thus prevent it from impinging upon the packing 72 at the outer end of the stem or the breather plug.

Having thus described my inventin, what I claim is:

1. A hydraulic jack comprising a frame, a power arm pivotally carried by the frame, a power unit pivotally mounted in the frame and connected to the power arm, an operating handle pivotally attached to the frame and connected to the power unit, and locking means carried by the handle, the power unit being formed with means, any one of which may be engaged by the locking means.

2. A hydraulic jack comprising a frame, a power arm pivotally carried by the frame, a power unit pivotally mounted in the frame and connected to the power arm, an operating handle pivotally attached to the frame and connected to the power unit, a locking plunger slidably carried by the handle, and actuating means carried by the handle and connected to the plunger, the power unit being formed with surfaces engageable with the plunger, whereby the operating handle may be locked in a number of various positions.

3. A hydraulic jack comprising a frame, a power arm pivotally carried by the frame, a power unit pivotally mounted in the frame and connected to the power arm, an operating handle pivotally attached to the frame and connected to the power unit, a locking plunger slidably carried by the handle, actuating means carried by the handle and connected to the plunger, the power unit being formed with surfaces engageable with the plunger, whereby the operating handle may be locked in a number of various positions, and detent means for holding the plunger in its two extreme positions.

4. In a hydraulic vehicle jack, the combination with a wheeled frame, and a power arm pivotally carried by said frame, of a power unit comprising an integral casting pivotally mounted between the members of the frame, said casting being formed with a power cylinder opening at the forward end of the casting, a pump cylinder having its end opening at the rear end of the casting, a reservoir arranged behind the cylinder and above a portion of the plunger, a power piston mounted in the power cylinder and connected to the power arm, said piston being movable toward the forward end of the device when raising the power arm, a plunger mounted in the pump cyl-

inder and movable toward the rear end of the device when being moved outwardly in its cylinder, means pivotally mounted upon the frame for operating the pump plunger, valved ports connecting the pump cylinder and the power cylinder with the reservoir and for connecting the pump cylinder with the power cylinder, a cover for the reservoir, a release valve carried by the reservoir cover and having its tapered end engageable with the port connecting the reservoir and the power cylinder, and means for actuating the release valve.

5. A hydraulic jack comprising a two-part frame, each of the frame members being formed with an integral spacing arm extending toward the opposite frame member, the inner ends of the arms being in overlapped relation and secured together by suitable means, a power arm pivotally carried by the frame, a power unit pivotally mounted in the frame and connected to the power arm, an operating handle pivotally attached to the frame and connected to the power unit, and locking means carried by the handle, the power unit being formed with means, any one of which may be engaged by the locking means.

6. In a hydraulic vehicle jack, the combination with a wheeled frame, and a power arm pivotally carried by said frame, of a power unit pivotally carried by the frame, said unit being formed with a power cylinder opening at the forward end of the unit, a pump cylinder having its end opening at the rear end of the unit, a plunger mounted in the pump cylinder and movable toward the rear end of the device when being moved outwardly in its cylinder, a reservoir arranged behind the cylinder and above a portion of the plunger, a power piston mounted in the power cylinder and connected to the power arm, said piston being movable toward the forward end of the device when raising the power arm, means pivotally mounted upon the frame for operating the pump plunger, valved ports connecting the pump cylinder and the power cylinder with the reservoir and for connecting the pump cylinder with the power cylinder, a cover for the reservoir, a release valve carried by the reservoir cover and having its tapered end engageable with the port connecting the reservoir and the power cylinder, and means for actuating the release valve.

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